WHERE IS THE FAULT? ECFL30 GIVES THE ANSWER!

FOUR INSTRUMENTS IN ONE

• Active Bridge for accurate location of faults where the level of disturbing voltages are low
• Passive Wheatstone Bridge for location of faults where the level of disturbing voltages are high
• Graaf Fault Locator for accurate fault location on totally water-soaked cable where the disturbing voltages are usually high and intermittent
• TDR to find low impedance faults and splits causing cross talk between the pairs. Manual and Automatic configuration provided

APPLICATIONS AND FEATURES

The CABLE FAULT LOCATOR ECFL 30 hand-held instrument is intended to test the quality of telecom cables and to locate cable faults. That combined instrument provides several tools for the accurate location of DC/AC faults on the line:

Resistance Measurements
- Loop resistance
- Resistance difference
- Insulation resistance

Capacitance Measurements
- Cable capacitance
- Capacitive balance

DC Fault Location Methods
- Murray
- 3 Point
- Küpfmüller
- Repeated Küpfmüller

AC Fault Location Methods
- Interruption
- Repeated Küpfmüller

Graaf Fault Location Method
- End to end Master-Slave measurement
- Fault location on totally water-soaked cable

TDR Measurements
- Single pair
- Double Pair Measurements
- XTALK
- Comparison to Memory

AC-DC Voltage measurements

Cable temperature measurement

Extremely Simple Operation
• Easy to use menu system
• Many-sided topic oriented help system
• Large Graphic Display with Backlight

Operation is made extremely comfortable by means of pre-defined automatic test sequences:

Automatic Test Sequences
• Cable State Survey to find the best test method
• Quick Test of main parameters
• Quality Test Sequence

USB Ports for Result Transfer
• USB B device-port for direct PC connection
• USB A host-port for USB stick (Indirect transfer)

The indirect transfer is advantageous for the user who does not have administrative right to install a special driver to his PC.

ECFL 30 is suitable for the remote control of loop closing devices on the far end. Utilizing that feature just one person can perform measurements during which the far endings of the tested pair should be opened or closed (e.g Küpfmüller method).

Remote Controllable Far End Devices
• ELC 30 loop closing device to open or close the far end of the tested cable
• ECFL 30S slave unit to perform synchronic end to end Graaf measurement and open or close the far end of the tested cable.

Single End Line Test (SW option)
• Loss and data transfer speed estimation
**FAULT LOCATOR MODES**

### ACTIVE BRIDGE

- **Murray**
- **Küpfmüller**
- **3 Point**

### ELC 30 or ECFL 30S

### ECFL 30 or ECFL 30S

### PASSIVE BRIDGE

### TDR

**SPECIFICATIONS**

#### Measuring Modes
- **Single Pair**
  - L1, L2, L1 long time, L2 long time
  - L1 with automatic configuration
- **Double Pair**
  - L1 & L2, L1-L2, XTALK
  - XTALK with automatic configuration
- **Memory Modes**
  - L1 & Memory, L1-Memory

#### Measuring Ranges
- For non loaded cable (at V/2=100) up to 32 km
- For loaded cable (at V/2=10) 6.4 to 32 km

#### Evaluation of Results
- With Cursor and Marker
- Refreshing of waveform ~4/sec
- Zoom Maximum 16

#### Accuracy
- Fault location: 0.2% of range
- Resolution: 0.01 m

#### Propagation Velocity
- For non loaded cables
  - $V/2$: 45 to 149 m/µs
  - VOP: 30 to 99 %
- For loaded cables
  - $V/2$: 1.2 to 30 m/µs
  - VOP: 0.8 to 20 %

#### Pulse Characteristics
- Widths for non loaded cable: 4 ns to 6 µs
- Widths for loaded cable: 330 µs
- Amplitude: 1.3 to 12 Vpp into 120 Ω
  - Automatically changed with gain and width.

#### Line Connection
- Impedance: 120 Ω balanced
- Balance control: 50 to 270 Ω

#### Gain Control
- Range: 0 to 90 dB
- Steps: 6 dB/Step

#### Distance Dependent Amplitude Correction
- Number of steps: 10

#### Voltage
- DC voltage: up to 400 V
- AC voltage: up to 250 V eff
- Accuracy: ±3% ±1 V
- Frequency range: 15 to 300 Hz
- Input resistance: 2 MΩ

#### Loop Resistance
- Measuring range: 1 Ω to 10 kΩ
- Accuracy: ±0.3% ±0.1 Ω

#### Resistance Difference
- Measuring range: 10 kΩ to 300 MΩ
- Measuring voltage: 100 V
- Accuracy: 2 to 5% ±1 kΩ

#### Capacitance
- Measuring range: 1 nF to 2000 nF
- Measuring frequency: 11 Hz, 100 V
- Accuracy: ±2% ±0.2 nF

#### Capacitive Balance
- Measuring range: 1 nF to 2000 nF
- Measuring frequency: 11 Hz, 100 V
- Accuracy: ±2% ±0.2 nF

#### DC Fault Location
- Test Methods: Murray, Küpfmüller, 3 Point
- Loop resistance range: 1 Ω to 10 kΩ
- Fault resistance range: up to 100 MΩ
- Measuring voltage: 100 V
- Accuracy (RL=2 kΩ, Lx/L=0 to 1)
  - Fault resistance < 1 MΩ: ±0.2 %
  - Fault resistance 1 MΩ to 5 MΩ: ±0.3 %
  - Fault resistance 5 MΩ to 25 MΩ: ±0.5 %
  - Fault resistance 25 MΩ to 100 MΩ: ±2 %

#### AC Fault Location Interruption
- Range: up to 20 km (Depends on cable type)
- Accuracy: ±2% ±0.2 nF
### PASSIVE BRIDGE

**Loop Resistance**
- Measuring range: 1 Ω to 10 kΩ
- Measuring voltage: 100 V
- Accuracy: ±0.2% or ±0.2 Ω

**Insulation Resistance**
- Measuring modes: Quick measurement, Quality measurement
- Measuring range:
  - Quick measurement: 10 kΩ to 300 MΩ
  - Quality measurement: up to 10 GΩ
- Measuring voltage: 100 V
- Accuracy:
  - 1 kΩ to 50 MΩ: 5% ± 1 kΩ
  - 50 MΩ to 100 MΩ: 10%
  - 100 MΩ to 5000 MΩ: 20%
  - 5000 MΩ to 10 000 MΩ: 30%

**Resistance Difference**
- Loop resistance range: 1 Ω to 5000 Ω
- Accuracy: ±0.2% of Rl ±0.2 Ω
- Resolution of Lx/L (Mk)-value:
  - In range ∆R <10%: 1/10000
  - In range ∆R >10%: 1/1000

**DC Fault Location**
- Test methods: Murray, Küpfmüller, 3 Point
- Fault resistance range: 1 Ω to 10 kΩ
- Measuring voltage: 100 V
- Accuracy:
  - Rl=2 kΩ, Lx/L=0,1 to 1: 0.2 %
  - Fault resistance ≤1 MΩ: ±0.3%
  - Fault resistance ≤5 MΩ to 25 MΩ: ±0.5%
- Resolution of M value: 1/1000

**AC Fault Location Küpfmüller Method**
- Loop resistance range: 1 Ω to 10 kΩ
- Fault resistance range: up to 25 MΩ
- Measuring voltage: 11 Hz, 100 V
- Accuracy:
  - Rl=2 kΩ, Lx/L=0,1 to 1: 0.4 %
  - Fault resistance ≤1 MΩ: ±0.1%
  - Fault resistance ≤5 MΩ to 25 MΩ: ±0.5%
- Resolution of M value: 1/1000

**AC Capacitive Balance**
- Measuring range: 10 nF to 2000 nF
- Accuracy of Lx/L value: ±0.2%
- Measuring voltage: 11 Hz, 100 V
- Resolution of Lx/L value:
  - In range Lx/L=0.9 to 1.1: 1/10000
  - In range Lx/L=0.9 or Lx/L>1.1: 1/1000

**Fault Location Graaf Method**
- Loop resistance range: 10 Ω to 10 kΩ
- DC current range: 10 μA to 1 A
- Accuracy of current measurement: ±0.3% ±2μA
- Accuracy of Lx/L value (current >0.1mA) ±3%
- Accuracy of Lx/L value (current >1mA) ±0.3%

### PRE MEASUREMENTS

**Repeated Disturbing Voltage Measurement**
- Measuring range: up to 400 V DC, 250 V AC
- Test results: Vab, VaE and VbE
- Measuring range: 10 kΩ to 300 MΩ
- Measuring time: ~3 sec
- Measuring voltage: 100 V

**Repeated Loop Resistance Measurement**
- Measuring range: 1 Ω to 10 kΩ
- Accuracy: ±0.5% ±0.2 Ω

**Repeated Insulation Resistance Measurements**
- Measuring mode: Repeated measurement
- Measuring range: 10 kΩ to 300 MΩ
- Measuring time: ~3 sec
- Measuring voltage: 100 V

**Repeated DC Current Measurement**
- Measuring range: 5 μA to 0.1 A
- Accuracy: ±0.5% 0.1 μA
- Temperature with Pt 1000 temperature probe:
  - Temperature range: 20°C to +60°C
  - Resolution: ±0.1°C
  - Accuracy: ±0.4°C

### AUTOMATIC QUICK TEST

**Disturbing Voltage**
- Measuring range: up to 400 V DC, 250 V AC
- Test results: Vab, VaE and VbE
- Measuring range: 10 kΩ to 300 MΩ
- Measuring time: ~3 x 20 sec
- Measuring voltage: 100 V

**Capacitance**
- Measuring range: 10 to 2000 nF
- Test result: Unbalance %
- Measuring voltage: 11 Hz, 100 V

### AUTOMATIC QUALITY TEST

**Insulation**
- Measuring range: 10 kΩ to 10 000 MΩ
- Measuring time: ~3 x 35 sec
- Measuring voltage: 100 V

**Capacitance**
- Measuring range: 10 to 2000 nF
- Test result: Unbalance %
- Resolution: 1/1000

**Loop Resistance**
- Measuring range: 1 Ω to 10 kΩ
- Accuracy: ±0.3% ±0.1 Ω

**Resistance Difference**
- Loop resistance range: 10 Ω to 5 kΩ
- Resolution: 1/1000

### SURVAY OF PAIR CONDITION

The purpose of this measurement is to find the optimal fault location method. Measured parameters:
- Disturbing voltage
- Capacitance
- Loop and wire resistances
- Insulation resistances
## GENERAL SPECIFICATIONS

### Power Supply
- Internal rechargeable NiMH battery pack
- Operation time: approx. 8 hours (Without backlight)
- Charging (without taking the battery pack out): From 100 to 240 V mains with mains adapter, From 12 V car battery with car adapter
- Charging time: less than 3 hours (Fast charging mode)
- Display: 320 x 240 color LCD TFT with backlight

### Connectors
- Connector for mains adapter: 2.1/5.5mm coax L1 and L2 line connectors
- 4 mm banana sockets
- Ground connector
- USB A: USB 1.1 host port for USB-Stick (FAT16, FAT32 file system supported)
- USB B: USB 1.1 device port to connect PC (Device driver provided)

### Over Voltage Protection
- Between a and b or ground: 500 V DC, 350 V AC
- Longitudinal voltage: 60 V AC

### Ambient temperature ranges
- Reference: 23±5°C Rel. humidity 45% to 75%
- Normal operation: 0 to +40°C Rel. humidity 30% to 75% *(<25g/m³)
- Limits of operation: -5 to +45°C Rel. humidity 5% to 95% *(<29 g/m³)
- Storage and transport: -40 to +70°C Rel. humidity 95% at +45°C *(<35g/m³)
- Protection: IP 54

### Memory Locations
- For test results: 50
- For cable parameter: 50

### Mechanical Data
- Dimensions: 224 x 160 x 75 mm
- Weight (Including battery pack): ca. 1.8 kg

* Without condensation

## ORDERING INFORMATION

**CABLE FAULT LOCATOR**
**ECFL 30**

**Including:**
- Operating manual
- Short form operation instruction
- Calibration Certificate
- CD
- Ground cable
- 2-wire test lead (red/black)
- 2-wire test lead (blue/yellow)
- Mains adapter 100 to 264 VAC
- USB cable
- USB stick
- Battery pack (built-in)
- Carrying case

**HW Options**
- Loop closing device ELC 30
- Intelligent Slave ECFL 30S
- Coaxial adapter ECA 10
- Car battery adapter EAA 10
- Temperature probe PT 1000

**SW Options**
- Result transfer PC SW
- Multi section Cable SW
- Loaded Cable SW
- Single End Line Test SW

**Others**
- Calibration Report

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ELEKTRONIKA reserved the right to change specifications without prior notice!

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